NOTES.

The Council of the Royal Society have fixed Wednesday, May 1, for the first Soirée of the Session. The Ladies' Conversazione will be held on some convenient day in June, probably the 12th.

We understand that Sir Joseph Lister, Bart., the Foreign Secretary of the Royal Society, will be nominated for the presidency of the Liverpool meeting of the British Association, to be held in 1896.

Prof. W. C. Unwin, F.R.S., will deliver the "John Forrest" lecture this year, at the Institution of Civil Engineers, on "The Development of the Experimental Study of Heat Motors."

A series of Cantor Lectures, on Commercial Fibres, will be commenced at the Society of Arts, John Street, Adelphi, on Monday next, by Dr. D. Morris, C.M.G. The subsequent lectures will be on March 25 and April 1.

The 1895 conference of the Camera Club will be held on April 2 and 3, under the presidency of Captain W. de W. Abney.

The death is announced of Sir Edward Bunbury, the author of "History of Ancient Geography." Mr. Alfred Giles, whose name is well known among engineers, has also recently died.

At the meeting of the Royal Meteorological Society, to be held on Wednesday, the 20th instant, a lecture will be given by Mr. W. N. Shaw, F.R.S., on "The Motion of Clouds considered with reference to their Mode of Formation."

The Council of the Society of Arts invite members to forward to the Secretary, on or before April 13, the names of such persons as they may think worthy of the Albert Medal for 1895. The medal, which is given annually in recognition of "distinguished merit for promoting Arts, Manufactures, or Commerce," will be awarded in May.

It is interesting to note, in connection with the subject of Mr. Stromeyer's letter published last week, that Reuter's correspondent at San Francisco reports that vessels arriving there announce the occurrence, on the 2nd inst. of an earthquake in the bed of the Pacific Ocean. The disturbance was accompanied by a loud roar, coming, apparently, from the sea, which became covered with a mass of white foam, and subsequently rose in numerous geyser-like columns.

Mr. Hyde Clarke, the author of numerous works and memoirs on philology and mythology, and a member of the Council of the Anthropological Institute, died at the beginning of this month, in his eightieth year. So long ago as 1836 he planned, as engineer, and also surveyed, the Glasgow and South-Western Railway, with the Morecambe Bay Embankment. He was engaged a few years later in acoustic telegraphy, and was employed to report on the telegraph system for India. His writings cover a wide range of subjects, but he was best known for his contributions to philology.

Our attention has been drawn to a scheme, which owes its initiation to Canon Tristram, and for which further sympathy and support is needed. With the object of creating a more general interest in the study of Natural History, and to stimulate observation and research, it has been proposed to establish a fund for a medal or other prize to be given annually by the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, for the encouragement of field work and original observations in any branch of the subject, whether Botany, Geology, or Zoology. The prize will be offered for the best essay evincing intelligent study of any of the common objects noticed in the fields or woods, on the moors, or by the sea-shore, &c.; competitors to be residents in the counties of Northumberland or Durham, or in Newcastle-upon-Tyne. It has been determined to associate the medal with the name of the late Mr. John Hancock. The capital fund required to provide the medal will not be less than £200, towards which amount over £100 has already been given and promised. Subscriptions towards the fund may be sent to Mr. A. H. Dickinson or Mr. M. C. Potter, Hon. Secretaries of the Natural History Society, Newcastle-upon-Tyne.

The intention of the Ottoman Government to establish a geodynamic observatory at Constantinople has already been noticed in these columns (p. 180). The new institution forms a section of the Imperial Observatory, and is under the direction of Dr. G. Agamennone, who has just issued a valuable list of earthquakes felt throughout the empire in 1894. The chief interest of this catalogue centres in the accounts of the great earthquake of July 10, and the detailed record of its after-shocks. In the Observatory registers there are also preserved many seismic notices relating to previous years, which are to be edited and published at the earliest opportunity.

The seismic history of several districts in Italy has been worked out with great care and thoroughness by Dr. Mario Baratta. In his last paper (*Rivista Geogr. Ital.*, Gennaio, 1895), he treats of the earthquakes of Calabria Ultra. In this province there are five well-marked seismic centres, or radiants. From their position, and from the direction in which the epicentre is displaced, it is clear that they are closely connected with the prominent faults which have helped to shape the present surface features of the district. Dr. Baratta concludes that the earthquakes of 1783 were produced by vibrations of these faults, and that the shock of last November 16 was a repetition of the terrible disturbance of February 5, 1783, the areas most strongly affected by them both being almost or quite identical.

The Council of the Marine Biological Association has authorised the expenditure during the present year of a considerably larger sum for boat hire than has been spent in previous years. Naturalists who visit the laboratory during the coming season may thus expect increased facilities in their work, and ample supply of material for their researches. The Council, moreover, has authorised the director to offer free tables in the Plymouth Laboratory to naturalists who will be willing to render assistance in the arrangement of the collections in the museum, and in the collecting operations at sea. It is to be hoped that many will take advantage of the efforts which are being made to extend the usefulness of the magnificent laboratory at Plymouth.

The Prince of Monaco has recently reported upon the first scientific cruises of his yacht the *Princesse Alice*. The area investigated included the western basin of the Mediterranean, the Straits of Gibraltar, and the Gulf of Gascony, along the western coasts of Morocco, Portugal, and Spain, down to a depth of 4898 metres. Fifty-eight soundings and forty-six temperatures and samples of sea-water were taken in these localities. The trawlings made by the *Princesse Alice* in the western basin of the Mediterranean merely confirm the known poverty of the fauna of the great depths of this part of the Mediterranean; the Atlantic operations of the ship in 1894 were unfortunately impeded by prolonged and violent northerly winds.

Mr. J. Y. Buchanan, who has investigated the samples of water taken by the *Princesse Alice*, finds that the density of the Atlantic water is the same along the whole south coast of Spain as far as Cape Gata, owing to the existence here of a strong surface current setting eastwards. From Cape Gata eastwards only the denser water of the Mediterranean proper is met with. The difference between the ratios of salinity to alkalinity in the case of the Atlantic and Mediterranean waters is not very great, but is clearly marked. The mean coefficient of the Atlantic samples examined by Mr. Buchanan was 0·5000, and of the Mediterranean 0·4875; while the minimum coefficient of the Atlantic samples was greater than the maximum coefficient of the Mediterranean. A possible cause of the difference between the Mediterranean and Atlantic waters is sought in the abundance of calcareous rocks on the coasts of the former sea.

The first number of the new Chilian *Journal of Hygiene* has recently been issued. It is published under the direction of the Institute of Hygiene recently established in Santiago, and is printed in Spanish. The present volume confines itself to the history and development of the organisation of public hygiene in general throughout Chili, and an account is also given of the provision for official hygienic administration in Germany, France, England, and Belgium. One of the functions exercised by the Santiago Hygienic Institute is the analysis of substances for purposes of trade and commerce, and the granting of official certificates as to their quality. Considering the enormously high death-rate of Santiago, which is stated to reach 57 per 1000, some reform in hygienic matters is urgently needed, and it is to be hoped that the establishment of this new Bureau of Public Health may beneficially stimulate public and private enterprise in this direction.

We could not have a better example of the insufficient morphological descriptions which have become attached to some micro-organisms, than that afforded by Mr. A. Coppen Jones in his memoir on the tubercle bacillus, lately published. This investigator has studied this micro-organism for several years past at Davos, where he has had ample opportunity for the collection of tuberculous material, and, after most elaborate and painstaking researches, he considers that we are not yet in a position to assign its correct morphological place to the organism associated with consumption. Mr. Jones is of opinion that it probably stands in close relation to the moulds, and that it has far more right to be regarded as belonging to this category than to the schizomycetes in the strictest sense of the word. The conclusions are based upon very careful observations, and the memoir is abundantly furnished with beautiful illustrations. The tetanus bacillus has also been seen associated with mycelium threads, and Almquist is stated to have isolated two bacterial forms which produced a branched mycelium. The subject is a most interesting one, and well worthy the attention of morphologists.

At the meeting of the French Meteorological Society on February 5, an important discussion took place on the subject of anemometry and the vertical currents of the atmosphere, which have sometimes been recorded by the so-called clino-anemometer. M. Ritter thought that the ascending currents registered by those instruments were simply due to deviations of the atmospheric currents by obstacles, such as the tower on which the recording instrument was placed, which divides the current laterally, and also inflects it in an upward direction. M. Angot stated that such vertical currents do not rise to any great height, in proof of which he said that on making the ascent of the Pic du Midi, with an ascending wind caused by striking the incline of the mountain, a number of small papers thrown into the current only rose a few metres, and then fell down behind the observer. These observations tend to modify to a great extent the results of experiments on vertical atmospheric currents, which have from time to time been published, and make it advisable for further experiments to be carried out.

The Report of the Meteorological Council for the year ended March 31, 1894, has been recently presented to Parliament. In the department of ocean meteorology, the preparation of current charts for all oceans have been regularly proceeded with; the Council have procured from foreign meteorological offices nearly all the observations for the Pacific Ocean, with the view of rendering the generalised results as trustworthy as possible. The preparation and extraction of data for the south Atlantic and west coast of South America, have also been actively prosecuted. In the branch of weather telegraphy and forecasts, an important addition has been made by the receipt of daily reports from two stations in the Azores. Forecasts are prepared three times a day, either for publication in newspapers, or for the preparation of storm warnings, while during the hay-harvest season, forecasts were supplied to farmers and others, and were also widely distributed by the Board of Agriculture. The total percentage of success of these agricultural forecasts reached 91, being the highest yet recorded. Among the various publications the *Weekly Weather Report* supplies a very complete view of the chief meteorological changes over the greater part of Europe; considerable progress has also been made with the rainfall tables of the British Isles, the total number of stations for which the values for 1881–90 will be furnished is approximately 430, so that the general distribution of rainfall over our islands will be well represented. Among the miscellaneous researches carried on by the Council, we may mention the comparison of Dines's pressure tube anemometer, which shows the wind pressure at each instant; the vane is erected 93 feet above the ground, and the recording portion is in a room in the Meteorological Office. Upon the whole, the comparison speaks strongly in favour both of the reliability of this instrument, and of the mean record yielded by the Robinson cup anemometer, which has hitherto been generally in use, both in this country and abroad.

It has often been observed that a bright scarlet uniform will in a good photographic dark-room with ruby-glass windows, appear perfectly white. On this subject Herr H. W. Vogel made some interesting communications to the Physical Society of Berlin at a recent meeting. Experimenting with oil lamps provided with pure red, green, and blue colour screens, he found that when white light was rigidly excluded, all sense of colour disappeared to the observers, and nothing but shades of black and white could be distinguished on objects in the room. He further found that a scale of colours illuminated by red light showed the red pigments as white or grey, which abruptly turned into yellow, and not red, on adding blue light. Hence a colour was perceived which was not contained in either of the sources. Red and yellow patches appeared of the same colour, so that they could hardly be distinguished. But the difference was at once brought out by adding green instead of blue light. How very much the kind of sensation experienced depends upon the intensity of illumination is easily seen in the case of the region of the spectrum near the G line of Fraunhofer. This region appears violet when its luminosity is feeble, blue when it is stronger, and may even appear bluish-white with strong sunlight, so that the assertion often made that with normal eyes a definite colour-sensation corresponds to a definite wave-length, cannot be upheld. Herr Vogel comes to the conclusion that our opinion as to the colour of a pigment is guided by our perception of the absence of certain constituents. Thus a red substance is only recognised as such when light of other colours is admitted, and we perceive its inability to reflect these.

At the meeting of the Institution of Civil Engineers, on Tuesday, March 5, two papers, dealing with the transmission of power by electricity, were read. The first, on "Electrical Haulage at Earnock Colliery," by Mr. Robert Robertson, contained an account of the general features of the colliery and of those of its seams into which electrical hauling-engines had been introduced to drive endless ropes, and to replace horse-traction between the main haulage-roads and the working-faces. The electrical generating plant comprised a dynamo for supplying power to the electrical hauling-engines, capable, at a speed of 620 revolutions per minute, of an output of 100 amperes at 490 volts. Two electrical hauling-engines, of which the main features were similar, were used. The two cables of stranded steel wire ⅝ inch in diameter, operated circuits of 2160 yards and 1020 yards in length respectively. The cables were driven continuously at a uniform speed, and the coal-hutches were attached to or detached from them by a Smallman clip. The efficiency of the plant as compared with the horse-traction, which it had replaced, was also considered. The electrical haulage-system in the Ell coal seam was capable of a daily output of 400 tons. The daily output by horse-traction had been 180 tons, and to increase this to 400 tons, thirty or forty horses would have been required, a number which could not have been employed in the available space without confusion. The daily output of the electrical haulage-system in the main coal-seam, which was not yet working at its full capacity, was between 150 and 200 tons. The yearly working expenses of the two systems were compared, upon the results of one and a half years' working, and were found to be £4130 and £1990 by horse-traction and by electrical haulage respectively, showing that an annual saving of £2140 had been effected by the latter. The total cost of the electrical installation had been £3500.

In the second Paper—"Water-Power applied by Electricity to Gold-dredging," by Mr. Robert Hay—an account was given of plant which had been erected in New Zealand to utilise water-power for generating electricity to be transmitted to motors operating a dredge in different portions of a distant river. The plant described had been constructed for gold-dredging in the River Shotover, the course of which was for the most part in rocky gorges through rugged country, accessible only by tracks cut down the leading spurs and gullies. The water was obtained at a creek 1½ miles distant from the dredging ground, and was brought by a race cut in the side of the hill, or, in places where the ground was not suitable, in a timber-flume, to a pressure tank at a level of 524 feet above the pipes at the generator-house. From this tank to the wheel employed the water was carried in rolled-steel pipes. The prime-mover of the generating plant was a Pelton reaction water-wheel, upon the buckets of which the water, from a nozzle 1½ inches in diameter, impinged at a pressure of 228 lbs. per square inch. This wheel drove two series-wound dynamos working at a normal speed of 700 revolutions per minute, each developing a current of 40 amperes at an electromotive force of 650 volts, or together nearly 70 h.p. The conductors, of a length of two miles, were of No. 4 S.W.G. bare copper wire, and were supported upon insulators carried by cross-arms upon old 40-lb. rails. The current was conducted to two motors in the dredge, one for driving a centrifugal pump, and the other for operating the buckets, winches, and revolving cylinder. Two 10-ampere arc-lamps lighted the dredge at night, and were joined in multiple-series with the motors, with suitable arrangements for their control. The cost of the installation and the weekly working expenses were £7000 and £35 respectively.

At a recent meeting of the Academy of Science of Amsterdam, M. Kamerlingh Onnes presented a paper by M. L. H. Siertsema, on magnetic rotary dispersion in oxygen. Since making a preliminary communication on this subject, the author has improved his apparatus in several details, and is now able to examine the gas under a pressure of a hundred atmospheres. The oxygen employed was prepared by electrolysis. The measurements of rotation are made by the well-known method in which white light, having passed through the polariser, observing tube, and analyser, is then examined by means of a spectroscope. A dark band is thus obtained traversing the spectrum, and the analyser is turned till this dark band coincides with the part of the spectrum corresponding to light of any desired wave-length. With currents between 35 and 65 amperes, the author is able to get rotations of from 3° to 4°. In the case of oxygen the results are very well expressed by the formula $\gamma = \frac{868 \cdot 028}{\lambda}\left(1 + \frac{0 \cdot 07202}{\lambda_2}\right)$ where λ is the wave-length in thousandths of a millimetre; the mean error in γ being ± 17·5. This formula is deduced from the formula $\gamma = \frac{c}{\lambda}\left(n - \rho\lambda\frac{\delta n}{\delta\lambda}\right)$ where n is the refractive index, given by Mascart. A series of measurements were also made on atmospheric air, and the values for nitrogen deduced by comparison of these numbers with those obtained for oxygen. The expression thus obtained for nitrogen is as follows :—

$$\gamma = \frac{560 \cdot 41}{\lambda}\left(1 + \frac{0 \cdot 32424}{\lambda^2}\right).$$

An interesting series of experiments have been carried on by Mr. T. Andrews, on the influence of stress on the corrosion of metals, which may have considerable practical applications. Bars of iron or steel were subjected to different stresses, and were then placed in some electrolyte—generally a solution of common salt—and the difference of potential between them measured. It was found that tensile stress caused the production of an average E.M.F. of 0·016 volt between the strained and unstrained bars, the latter being positive. The effect of torsional stress was to produce an average E.M.F. of 0·012 volt in the same direction. Similar results were obtained with flexional strains. From the data obtained, the author deduces a number of interesting conclusions which bear on the corrosion of iron structures, for which we must refer to the original paper in the *Proceedings* of the Institution of Civil Engineers, cxviii. 4.

The ever-increasing precision in the study of the geological distribution of fossils renders it necessary, from time to time, to recognise that a well-marked lithological division, though of the greatest value in geological mapping, does not represent a definite time-level, but may gradually rise or fall in time as it is traced along its outcrop. This fact is well illustrated in England by the Cretaceous beds underlying the true Chalk, and some of the questions involved have been discussed in two recent papers in the *Geological Magazine*. The first of these, by Messrs. Jukes-Browne and Meyer (November, 1894) deals with the Upper Greensand and Chloritic Marl. They point out that the latter term has been applied—and may justly be in its lithological sense—to various horizons up to the zone of *Belemnitella plena* (as at Beer Head), and they propose that if the name be retained it should be strictly limited to the zone of *Stauronema Carteri*, which may be regarded as the bottom bed of the true Chalk. They further point out that the well-known Warminster fossils are a mixture of two faunas—the majority coming from the summit of the true Upper Greensand, just below the *Stauronema* zone, though some are from that zone itself, the state of preservation being different in the two cases. Thus the confusion between Chloritic Marl and Warminster Greensand is due to a mixture of fossils from different levels—an accident that has often caused confusion in other formations—and a complete revision of the lists of fossils from these horizons must precede any further correlation. The second paper, by Dr. J. W. Gregory (March, 1895), deals with the Gault and Lower Greensand. After considering evidence of various kinds, he comes to the conclusion that the conformable passage from sandy beds into clay rises in time as it passes westward from Kent to Surrey, much as the upper limit of the clay sinks further west towards Wiltshire. The lowest zone of the Gault in Surrey that has the typical clayey facies is equivalent to the fourth or higher zone of the Folkestone Gault, the lower zones being represented in the so-called "Folkestone Sands." Dr. Gregory indicates the levels at which, in Kent and Surrey respectively, the limits of the Albian, Upper and Lower Aptian, and Rhodanian formations of the Continent can be drawn; but insists on the necessity of continuing to recognise the old lithological divisions side by side with the new palæontological ones. He also gives a critically revised and extended list of fossils from the phosphate beds of Great Chart, near Ashford, Kent.

The 1894 "Report of Observations of Injurious Insects and common Farm Pests," by Eleanor A. Ormerod, will not yield to any of its predecessors in interest, value, or variety. The general character of these Reports is so well known that it is unnecessary to dwell upon it; but the present part gives prominence to several considerations which have not hitherto received very much attention. The first of these is the undoubted fact that almost any of the 12,000 species of insects inhabiting the British Islands, except those which feed exclusively on other insects, may, under certain circumstances, or when unusually abundant, become entitled to a place in the category of injurious insects. Thus, the present Report opens with figures and descriptions of three species of *Lepidoptera*—the Eyed Hawk Moth, the Lappet Moth, and the large Tortoiseshell Butterfly—which are not generally so common in England as to be thought capable of causing serious injury; indeed, Miss Ormerod herself suggests that such pests might easily be got rid of by inviting an entomologist to clear them off. One of the most important insect visitations during the past year was that of the Antler Moth (*Charæas graminis*) in South Scotland, where the larvæ fed on the tender grass which sprang up over the districts previously devastated by the vole plague. Several pages are devoted to hay mites, which appear, however, though sometimes excessively abundant, to cause little real damage. Other interesting creatures noticed are the eel-worms (in her account of which Miss Ormerod has unintentionally in part anticipated Prof. Percival's important paper on the subject in *Natural Science* for March, as fully explained in an accompanying note), horse-warble, winter gnats, wasps, &c. It does not appear to be quite certain whether the horse-warble is the same species as the ox-warble. Warble in the horse appears to be of much less common occurrence than in the ox, and usually to occur only in small numbers in the same animal. But this may be due to the horse being a more carefully-tended animal than the ox. Two other points of interest deserve notice. Several species of carnivorous ground-beetles are stated to be very destructive to strawberries. More information is certainly required as to how far so-called carnivorous insects will also eat vegetable matter, decaying or otherwise. It appears that sea-gulls are sometimes in the habit of frequenting turnip-fields infested with the Diamond Back Moth, and in one instance a farmer attributed the destruction of his crop to the gulls. So easy is it to make a serious error in discriminating between the farmer's friends and foes.

A new and particularly convenient method of preparing the unsaturated hydrocarbon allylene, C_3H_4, has been discovered by Prof. Keiser and Miss M. B. Breed, as the result of an investigation concerning the action of magnesium upon the vapours of the alcohols. Preliminary experiments showed that when magnesium is heated with organic compounds such as alcohols, acids, and ketones, a reaction of considerable energy occurs at more or less elevated temperatures, accompanied by incandescence of the metal. The reactions between magnesium and the alcohols were then systematically studied. The magnesium, in the form of filings, was placed in a porcelain boat, and heated in a combustion tube through which the vapour of the alcohol was conducted. At a low red-heat the magnesium usually commenced to glow at one end of the boat, and the incandescence was then rapidly communicated to the whole quantity of metal, while large volumes of gas were evolved from the tube. When methyl alcohol is employed the action is extremely energetic, and the gases evolved consist mainly of about four-fifths hydrogen and one-fifth marsh gas. The residue in the boat is then allowed to cool in the vapour of the alcohol, when it is found to have the appearance of a black coherent mass. When this solid residue is placed in water a gas is slowly evolved, and if a few drops of ammonium chloride are added, the gas is liberated in a steady and moderately rapid current. The odour of the gas resembles that of acetylene, but when it is conducted through an ammoniacal solution of cuprous chloride the greenish yellow precipitate of cuprous allylide is produced, and with an ammoniacal silver nitrate solution the white crystalline precipitate of silver allylide is formed. These precipitates are highly explosive after separation and drying, a temperature of 150° being sufficient to bring about their explosion. When they are treated with dilute nitric or hydrochloric acids they dissolve with evolution of allylene. Ethyl alcohol behaves similarly towards heated magnesium, and the black residue left in the boat after the completion of the reaction is similarly decomposed by water with liberation of allylene, the rapidity of evolution of the latter being also largely augmented by the addition of a little ammonium chloride. The most convenient alcohol to employ, however, is propyl alcohol, for the black magnesium residue is in this case decomposed much more rapidly by water at the ordinary temperature, and the yield of gas is considerably larger. Prof. Keiser states that this method of preparing allylene for lecture purposes, by the reaction between magnesium and propyl alcohol, and subsequent decomposition of the product by water, is far preferable to the ordinary method of decomposing propylene bromide with alcoholic potash. Most of the other alcohols likewise afford magnesium residues which liberate allylene when brought in contact with water, but the gas is rarely so pure as that derived from the use of propyl alcohol.

The additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*, ♂) from India, presented by Mrs. Turner-Turner; an Azara's Fox (*Canis azaræ*) from Brazil, presented by Messrs. Edgar and Harold Turner; four Amadavade Finches (*Estrelda amandava*) from India, presented by Mrs. Faulkenor; a Chukar Partridge (*Caccabis chukar*) from India, deposited; a Sykes's Monkey (*Cercopithecus albigularis*, ♀) from East Africa, two Red-crested Pochards (*Fuligula rufina*, ♂ ♀) from India, purchased; a Great Kangaroo (*Macropus giganteus*, ♂), three Hunter's Spiny Mice (*Acomys hunteri*) born in the Gardens.

OUR ASTRONOMICAL COLUMN.

Spectrum of the Orion Nebula.—A full account of the photographs of the spectrum of the Orion Nebula, which were taken with Mr. Lockyer's 30-inch reflector at Westgate-on-Sea in 1890, has just been published in the *Philosophical Transactions* (vol. 186 A, p. 73.) Four hydrogen lines more refrangible than K are shown on the photographs, and in all 54 lines have been recorded. The line near wave-length 3730, first discovered by Dr. Huggins, is a very strong line, and among other prominent lines, is the well-known chromospheric line at wave-length 4471. It is shown that many of the principal lines are coincident with bright lines photographed in the spectrum of P Cygni at South Kensington, and with bright lines in planetary nebulæ and bright line-stars photographed by Campbell and Pickering, so that a close connection of these bodies is